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NONDESTRUCTIVE TESTING INFORMATION ANALYSIS CENTER, 1977.

Southwest Research Institute  
6220 Culebra Road  
San Antonio, Texas 78284

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11 1978

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15 February 1977 - 15 February 1978.

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Cameron Station  
Alexandria, Virginia 22314

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ARMY MATERIALS AND MECHANICS RESEARCH CENTER  
Watertown, Massachusetts 02172

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## L INTRODUCTION

On January 6, 1976, by amendment of contract DSA900-74-C-5268, the Department of Defense transferred to Southwest Research Institute full responsibility for operation of the Nondestructive Testing Information Analysis Center (NTIAC), and discontinued the Nondestructive Testing Data Support Center (NTDSC) as a separate function.

From its establishment in 1961, through 1975, NTIAC was operated by the U. S. Army Materials and Mechanics Research Center, Watertown, Massachusetts. In February, 1974, the Department of Defense supplemented the capabilities of NTIAC through a contractor operated support function designated as the Nondestructive Testing Data Support Center (NTDSC). AMMRC continued, however, to bear responsibility as the officially designated DoD information analysis center in the field of non-destructive testing. Accordingly, AMMRC was charged to provide the interface with the NDT community for services of both NTIAC and NTDSC. During the period from February, 1974 to January, 1976, AMMRC worked closely with NTDSC to develop the latter's capability to function independently as a full service information analysis center of technical excellence. A strong relationship between AMMRC and the now fully contractor operated NTIAC continues with AMMRC being designated as the contracting officer's technical representative responsible for technically monitoring NTIAC activities.

Other major provisions of the contract remain substantially unchanged. Southwest Research Institute is charged to operate NTIAC as a full service information analysis center of technical excellence, which includes principally: establishing and continuously maintaining an information support system that is comprehensive and current with respect to the field of non-destructive testing; responding to inquiries for technical or bibliographic information; publication of a current awareness periodical (the NTIAC Newsletter); and, in response to needs of the user community, preparation, publication, and marketing of timely, authoritative critical reviews, technology assessments, state-of-the-art surveys, data books, and handbooks.

In common with other DoD IAC's, NTIAC is required to establish and maintain a service charge system for its products and services with the goal of achieving an annual rate of reimbursement equal to at least 50 per cent of yearly direct funding.

→ The technical scope of NTIAC is that of the entire field of nondestructive testing, inspection, and evaluation--the full range of methods and techniques whereby a material, component, or entire system can be so characterized as to reliably predict its performance under a prescribed service regime. Table 1 indicates major current methods of nondestructive testing.

**Table 1**  
**Major Current Methods of Nondestructive Testing**

**• RADIOGRAPHIC AND RADIOMETRIC TESTING**

**X-rays**  
**Gamma rays**  
**Neutrons**  
**Filmless techniques**

**• ELECTROMAGNETIC TESTING**

**Eddy Currents**  
**RF fields**  
**Microwaves**  
**Magnetic flux analysis**  
**Magnetic particles**

**• ULTRASONIC AND ACOUSTIC TESTING**

**Ultrasonic transmission and reflectometry**  
**Ultrasonic imaging**  
**Spectrum analysis**  
**Acoustic emission**

**• LIQUID PENETRANT TESTING**

**Dye penetrants**  
**Fluorescent penetrants**

**• OPTICAL TESTING**

**Visual testing**  
**Optical reflectometry and transmission**  
**Holography**

**• THERMAL TESTING**

**Infrared radiometry**  
**Thermography**

The present organization and personnel of NTIAC are shown in Figure 1. We wish to note that prior to his assignment to NTIAC our editor was involved with the design of the scattered laser light inspection subsystem for the non-destructive Automated Bearing Inspection System (Mark I CIBLE). Mark I CIBLE (Critical Inspection of Bearings for Life Extension) recently received one of the one hundred IR-100 Awards presented by Industrial Research Magazine for 1977. The Mark I CIBLE was developed by the instrumentation research division, which also houses NTIAC, of Southwest Research Institute. By design, NTIAC is supported by the full resources of its host organization Southwest Research Institute, the organizational chart of which is shown in Figure 2. Of the total Institute Staff of 1500, approximately 200 professional staff constitute the resource of knowledge and expertise which can directly support NTIAC in its publications and information support systems.

In an important respect NTIAC is unique among DoD IAC's. It is the first IAC which was planned from the beginning to rely upon the Defense Documentation Center for automatic data processing (computer) services, as well as certain other essential support services. These are indicated in Figure 3.

In Chapter II the state of development of NTIAC's basic performance areas are summarized. In Chapter III plans and projections for the fifth year of operation are presented. The Appendices include detailed information obtained from a Newsletter Survey, a copy of the ASNT flyer, and statistical summaries, DSAH Form 1261, for the fourth quarter of the fourth contract year.

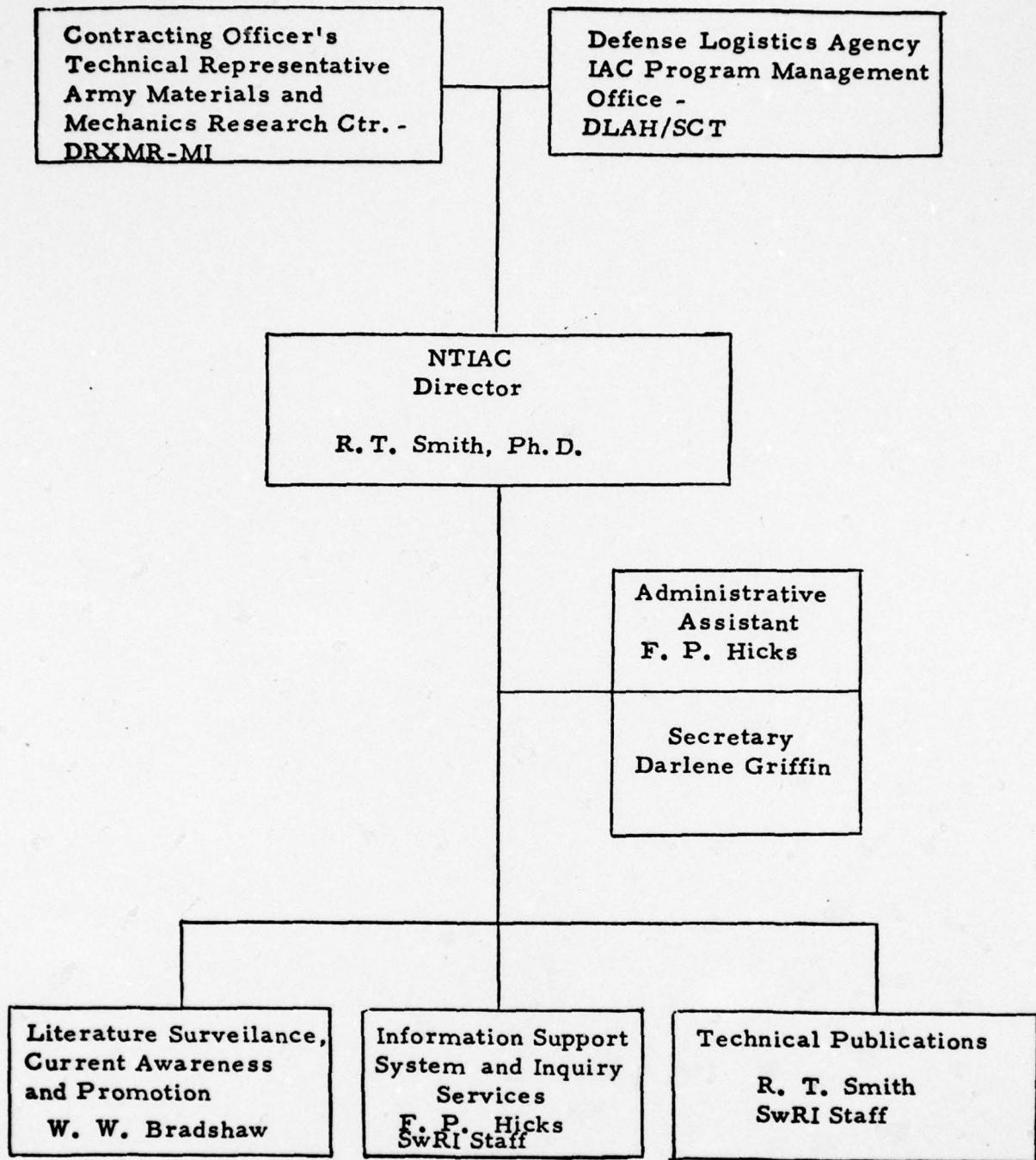


Figure 1

NTIAC Organization and Staffing

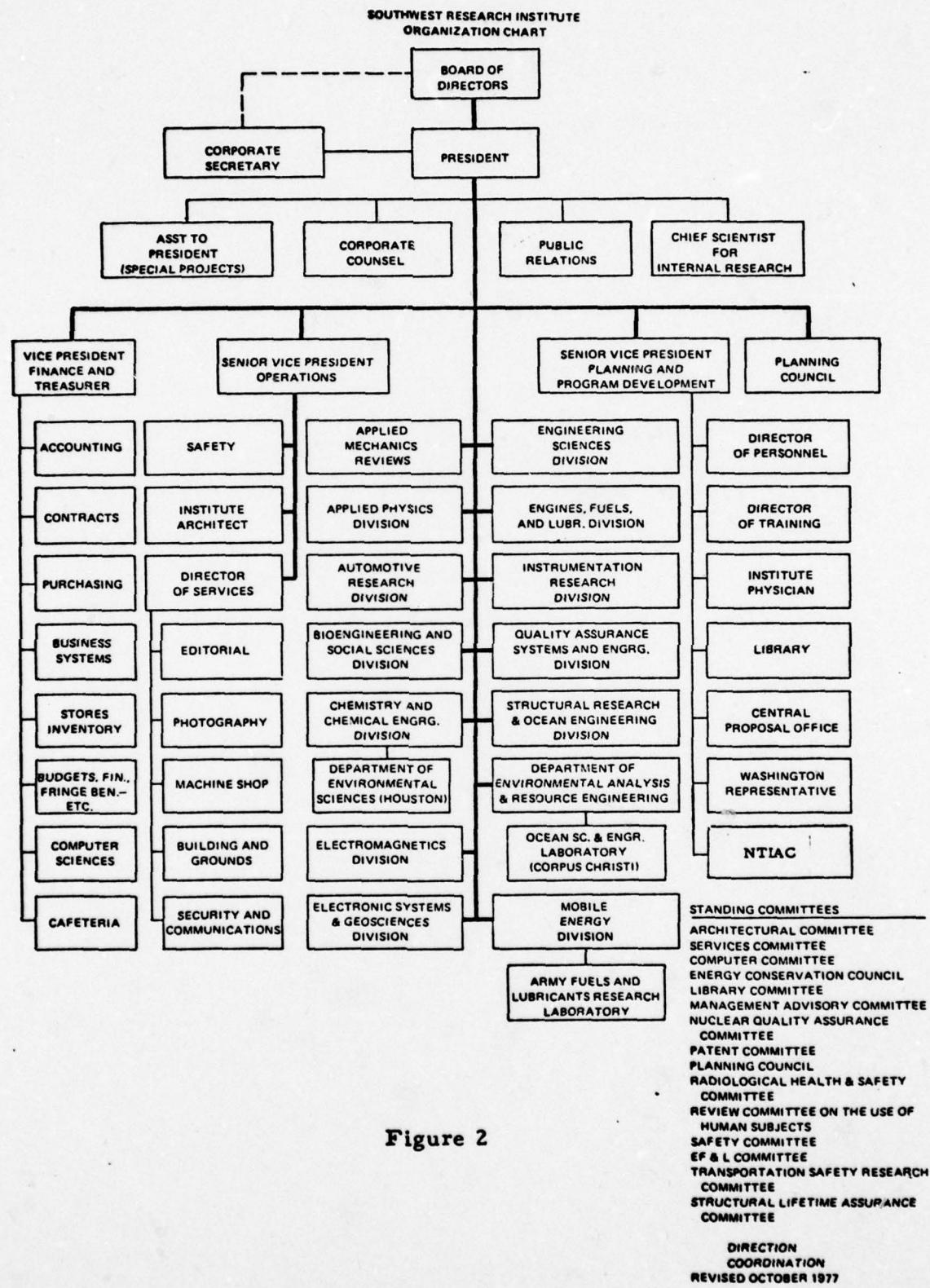


Figure 2

**DDC  
SUPPORT OF  
NTIAC**

- **RDT&E On-Line System Terminal**
- **TR-File; WU-File**
- **Unique NTIAC File & Inverted (Index) File**
- **Batch Input Service**
- **Off-Line Print-Out Service**
- **Special Output Format**
- **Hard Copy Print-Out and Indices of NTIAC File**
- **Selective Dissemination of Information Program**

**Figure 3**

## II. OPERATIONAL REPORT

### A. Introduction

The major areas of NTIAC's activity are: the information support system; current awareness and promotional activities; technical and bibliographic inquiries; technical publications; and special services. The status of each of these areas is reviewed in this chapter.

### B. Information Support System (ISS)

NTIAC's ISS comprises a document collection and computerized bibliographic data files. These are kept current through systematic surveillance of the world-wide literature in nondestructive testing and closely allied technical areas.

Surveillance of open literature is accomplished in two basic modes. The most important serial literature, books, conference proceedings, etc., is directly scanned. The "core" literature comprises those serials of which a significant fraction of the contents is ordinarily accessioned. The secondary literature comprises those serials which are also directly reviewed cover to cover, but from which only selected pertinent articles are accessioned. Table 2 lists the current core and secondary serials. As an added check on our surveillance effectiveness, we also scan Current Contents, NASA/SCAN, and the monthly Engineering Index and Science Abstracts. New books, conference proceedings, etc., are surveiled through informal channels, publishers' advertisements and catalogues, and reviews published elsewhere. It is noteworthy that all serial publications, books, proceedings, etc., are furnished to NTIAC by its host institution, Southwest Research Institute, through the Institute's library, without direct charge. (Exceptions are specific purchases made especially for NTIAC; such items become the property of NTIAC, i.e., of the U. S. Government.)

Surveillance of Department of Defense technical reports is accomplished by direct receipt of reports (where NTIAC has been placed on the primary distribution list) and the current awareness service provided by the Defense Documentation Center. A copy (in either ink print or microfiche) of each accessioned report is added to the NTIAC document collection.

Other U. S. Government reports and unpublished private sector reports are surveiled mainly by requesting copies through informal contacts with agencies and individuals engaged in nondestructive testing programs. Additionally, commercially available "dial up" bibliographic data files (mainly the NTIS file) are periodically searched for NTIAC related citations. This gives good coverage of publicly released U. S. Government reports, especially those of NASA, which are comparatively rich in the area of NDT.

Table 2

## NTIAC CORE JOURNALS

1. British Journal of Non-Destructive Testing (GB)
2. Institute of Electronics and Electrical Engineers, Transactions Acoustics, Speech, and Signal Processing (USA)
3. Institute of Electronics and Electrical Engineers, Transactions Instrumentation and Measurement (USA)
4. Institute of Electronics and Electrical Engineers, Transactions Sonics and Ultrasonics (USA)
5. Journal of the Acoustical Society of America (USA)
6. Journal of Testing and Evaluation (USA)
7. Materialprüfung (Ger.)
8. Non-destructive Testing International (GB)
9. Soviet Journal of Nondestructive Testing (USSR)
10. Ultrasonics (GB)
11. Materials Evaluation (USA)

SECONDARY SERIAL PUBLICATIONS  
SURVEILED AND REVIEWED BY NTIAC

1. ASEA Journal (Sweden)
2. ASTM Standardization News (USA)
3. Acustica (Ger.)
4. Aircraft Engineering (GB)
5. American Ceramic Society Bulletin (USA)
6. American Laboratory (USA)
7. Journal of Applied Mechanics, Transactions of ASME (USA)
8. Journal of Engineering for Industry, ASME (USA)
9. Journal of Engineering for Power, Transactions of ASME (USA)
10. Journal of Engineering Materials and Technology of ASME (USA)
11. Journal of Mechanical Design, ASME (USA)
12. Journal of Physics E - Scientific Instruments (GB)
13. Journal of Pressure Vessel Technology of ASME (USA)
14. Applied Optics (USA)
15. Applied Physics (USA)
16. Automated Control & Computer Sciences (USSR)
17. The Bell System Technical Journal (USA)
18. Canadian Aeronautics and Space Institute Transactions (Canada)
19. Composites (GB)
20. Control Engineering (USA)
21. Defense Management Journal (USA)
22. Electro-Optical Systems Design (USA)
23. Electro-Mechanical Design (USA)
24. Electronic Engineering (GB)
25. Engineering Fracture Mechanics (USA)
26. Engineering Index (USA)
27. Experimental Mechanics (USA)
28. IEEE Transactions on Instrumentation and Control (USA)
29. Industrial Laboratory (USSR)
30. Industrial Research (USA)

31. Industrial Electronics and Control Instrumentation IEEE (USA)
32. Instruments and Experimental Techniques (USSR)
33. International Aerospace Abstracts (USA)
34. International Journal of Fracture (Netherlands)
35. International Journal of Pressure Vessels and Piping (GB)
36. International Metals Review (GB)
37. Materials Engineering (USA)
38. Materials Performance (USA)
39. Materials Science and Engineering (Switzerland)
40. Measurement Techniques (USSR)
41. Metal Progress (USA)
42. Nuclear News (USA)
43. Optical Engineering (USA)
44. Quality (USA)
45. Quality Progress (USA)
46. RCA Review (USA)
47. Review of Scientific Instruments (USA)
48. SAMPE (USA)
49. Science Abstracts, Sections A & B (GB)
50. Wear (Switzerland)
51. Welding Journal (USA)

For each of the items accessioned by NTIAC, a computerized bibliographic record is created. Each such record comprises the pertinent fields, illustrated in Figure 4. Index terms (descriptors) are taken from a controlled word list prepared by NTIAC; this list is updated at least semiannually. In those cases where a bibliographic record already exists in the Technical Report file at DDC, NTIAC augments the DDC record by adding the NTIAC accession number and descriptors, thus effectively bringing such records into the NTIAC file.

The current status of NTIAC's bibliographic data file is presented in Table 3.

In addition to its own unique bibliographic data file, NTIAC also has access, through its RDT&E on-line terminal, to DDC's Technical Report File (based on DD Form 1473), and the Work Unit File (based on DD Form 1498). Table 4 gives our total utilization data, as well as a monthly average and comparison with other users. (This data is provided to us by DDC).

Table 4

CRT Utilization

Totals for year February 1977 - February 1978

Searches

TR	CF	WU	Total
2483	67	32	2582

Bibs

TR	WU	Total
165	18	183

Total documents ordered 828

<u>Average monthly utilization</u>			
	<u>Searches</u>	<u>Bibs</u>	<u>Documents</u>
All users	233	32	59
NTIAC	216	15	69

The Document Announcement Bulletin (DAB) printout became available from DDC during November 1976. We are now routinely receiving hard copy printout of all NTIAC files. This along with the generation of corporate author, personal author, and subject term indexes is of great value to NTIAC.

Southwest Research Institute has purchased a General Electric "Terminet 30" data communications terminal with remote batch print-out capability. This terminal is shared by the SwRI Library and NTIAC and is located in the NTIAC offices along with the DDC terminal and printer, making the overall operation convenient and efficacious. The use of this additional equipment for broader periodic searches of commercially available computerized data bases further ensures the adequacy of NTIAC's surveillance of the literature.

NTIAC

## LITERATURE REVIEW WORKSHEET

(42) NT-10959  
 (11)  
 AD-D301672

(16) Title

Nuclear Resonances in Metals

(10) Authors:

I. D. Weisman, L. J. Swartzendruber, L. H. Bennett

(22) Availability:

Published in Techniques of Metals Research; Vol. 1, Pt. 2;  
 1973; Chapter 9; 165-504

(33) Code: 1, 21

(43) Copy: 1

(21) Sup. Note:

See also NT-8281

(11) Date: 1973

(12) No.pp: 340

(35) Source Code:

(14) Source Series:

(15) Contract:

(18) Mon. Acronym:

(19) Mon. Series:

(9) Dscr. Note:

(34) Serial Dscr.:

(30) Annotation:

Authoritative. Advanced discussion.

(27) Abstract:

A general review of theory, experimental apparatus and technique, and representative results of nuclear resonances in metals. Covers continuous-wave and pulsed NMR, nuclear quadrupole resonance (NQR), NMR in ferromagnetic materials (FNR), the Mossbauer effect, and combined resonances (the Overhauser effect), acoustic modulation of Mossbauer spectra, nuclear magnetic acoustic resonance, helicon waves, and electron-nucleus double resonance. Also discussed are thermal effects, sample size and shape effects, diffusion, spurious resonances, calorimetric detection of NMR, and NMR in superconductors. (NTDSC)

(44) Descriptors:

\*Nuclear magnetic resonance, \*Nuclear quadrupole resonance,

\*Mossbauer effect, test book, reviews, acoustic nuclear resonance

Other key words:

Date Input:

Indexer:

Figure 4

## Table 3

**Status of the NTIAC Bibliographic Data Base**  
**15 February 1977 - 15 February 1978**

<b>Documents in file</b>	<b>13,510</b>
<b>Complete records</b>	<b>11,222</b>
<b>Partial records</b>	<b>2,288</b>

### C. Current Awareness and Promotional Activities

The NTIAC Newsletter continues to be well received. The circulation of the Newsletter increased from 2,969 at the beginning of the contract year to 3,960 at the end of the year. This represents a 33 per cent increase. This substantial growth in circulation was due mainly to the response to our flyer included with the ASNT August newsletter mailing. See Figure 5. Another high point of the year was the response to the NTIAC Readers Survey, published in the October issue. There were 348 responses to the Survey. This is 9.2 percent of our subscribers at that time. Fifty-four percent of the responses indicated a background in engineering followed by metallurgy at 30 percent, and materials science at 23 percent. The most popular present position was quality control/quality assurance with 56 percent; management and research were second and third with 36 and 26 percent respectively. The type of organization indicated most often was component/equipment manufacturer with 30 percent followed by Government agency, 17 percent, and industrial laboratory, 15 percent. The big five test methods with ultrasonic testing leading at 84 percent closely followed by radiography, penetrant testing, magnetic particle, and eddy current were clear winners. However, acoustic emission placed immediately after eddy current. Thus, there may soon by the big six instead of just big five. Other high scorers were materials properties and materials evaluation. In the Newsletter, the winner was feature articles followed by NDT news items and abstracts of interest. The contents of the Newsletter provoked quite a few written comments. The favorable and constructive comments outnumbered the unfavorable by eleven to one. For a complete summary of the results of the Readers Survey, refer to Appendix A.

During the contract year just ended, digests of eleven technical reports were featured. These articles concerned such topics as ultrasonic spectroscopy applied to flaw analysis; holographic interferometry and speckle photography; a survey of automated optical inspection; computer automated ultrasonic testing; computer controlled x-ray stress measurement; acoustic imaging; x-ray scintillography; early detection of fatigue damage; acoustic emission; a survey of rubber testing; and an electronically scanned circular ultrasonic transducer array. The twelfth feature was an article prepared by Harold Berger on the nondestructive evaluation program at the National Bureau of Standards which includes radiography, penetrants, wear, visual inspecting, eddy currents, microwaves, and thermal testing. The materials covered in the digests included layered composites, aluminum and titanium alloys, steel, plastics, and rubber.

During the year program previews of the 1977 ASNT Spring Conference, the 11th Symposium on Nondestructive Evaluation, the 1977 ASNT Fall Conference, and the 1978 ASNT Spring Conference were published in the Newsletter. Also, brief abstracts of the papers presented at the ARPA/AFML Review of Progress in Quantitative NDE were published in a continuing series as well as a short article on the Innovative and advanced NDT Radiography conference. Short articles publicizing a study for the improvement of industrial radiographic safety and the Joint Oil Analysis Program. Twenty-eight news notes published in the Newsletter ranged from airport pavement NDT to continuing education and cracks in Naval vessels. Sixteen calls for papers and 62 calendar items were published during 1977-78 as well as 38 recent contract awards and 48 abstracts of interest.

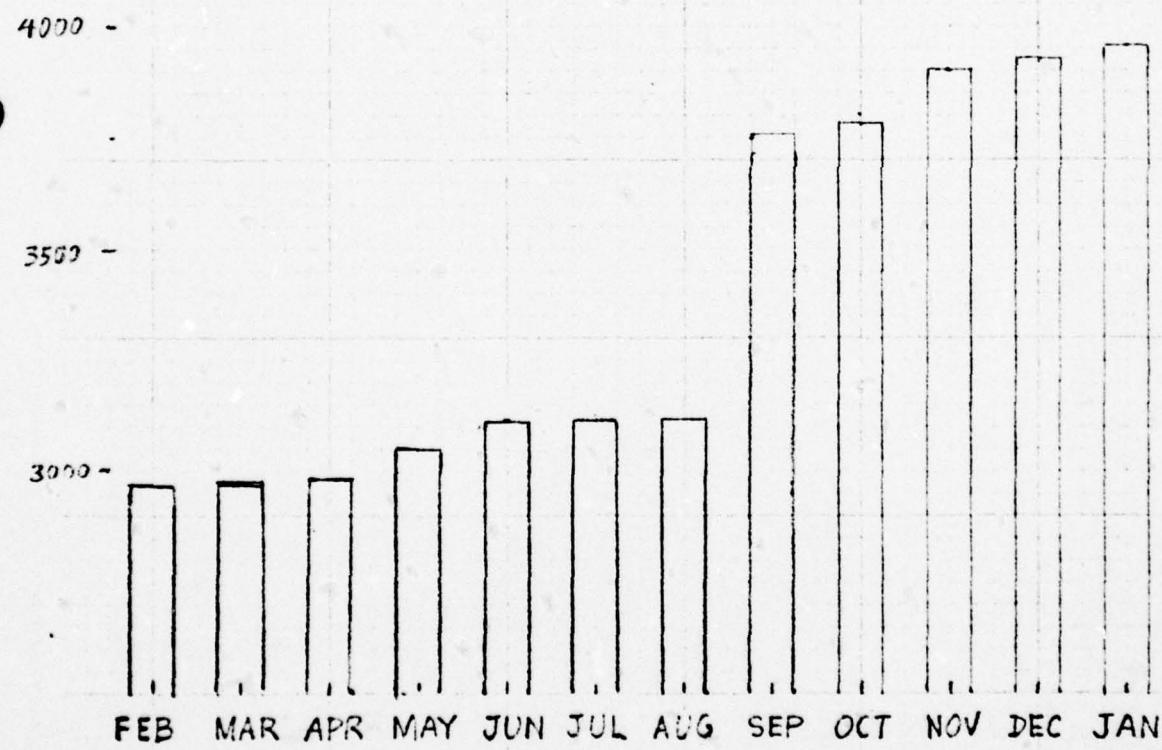


Figure 5. Growth of Newsletter Distribution during  
1977-78 Contract Year.

Table 5

## Current Status of Newsletter

Newsletter Recipients

Army	187
Navy	207
Air Force	181
DoD Non-Service	65
Other Government	170
Foreign	165
Foreign Government	53
U.S. Private Sector	<u>2909</u>
Total	3937

Current Awareness and Promotional Activities

Table 6 summarizes participation, promotional briefings, and displays presented by NTIAC at various conferences and meetings during the past year.

On February 19, 1977, Dr. R. T. Smith discussed the operation, services, and products of NTIAC at a combined meeting of the Texas Chapters of the Special Libraries Association, and the American Association for Information Science, held at Trinity University, San Antonio, Texas. He was one of three invited speakers to address this unique audience.

During the Southwestern Conference and Tool Show, sponsored by the Society for Manufacturing Engineers, Dr. Smith served as chairman of the technical session on nondestructive testing, and presented a talk entitled "Alternate Solutions to NDT Problems," which described the operation and services of NTIAC and how it can aid in solutions to problems in NDT. The conference was held at Houston, Texas, on March 2, 1977.

During the Spring Conference of ASNT, held at Phoenix, Arizona, NTIAC had a booth in the exhibit hall, which was a focal point of interest, conveniently available to all the conferees. This booth was highly effective in attracting potential users to us; approximately 200 User's Guides and sample copies of the Newsletter were distributed. Because only table top literature type displays were permitted, our display was prominent, and not overshadowed by elaborate commercial displays.

Dr. Smith attended the 11th Symposium on Nondestructive Evaluation held at San Antonio, Texas, and sponsored by the ASNT South Texas Section, on April 20-22. NTIAC had a small exhibit of sample Newsletters and copies of the User's Guide, and again there was considerable interest shown in our display. Approximately 100 copies of our User's Guide were distributed during the course of the meeting. This was an informal display and was not in competition with other displays.

During March 28 through April 1, the IAC Directors met at the O'Hare Hilton in Chicago for an informal get-together for an exchange of ideas. Subjects covered included marketing of IAC products, new pricing schedules for NTIS, evaluation forms for IAC publications, and planning for a joint display to be shown at forthcoming conferences of general interest to all the materials-oriented IAC's.

NTIAC was represented at the ASNT Conference on Innovative and Advanced NDT Radiography, held at the Brandywine Hilton Hotel, Wilmington, Delaware, August 2-5, 1977. Based upon this conference, a brief conference review was prepared and included in the August Newsletter.

Fran Hicks attended the DDC RDT&E on-line system user conference held at Alexandria, Virginia, on August 23-25. She heard presentations made on the following subjects: terminal status, effective terminal utilization, systems

enhancements, DDC future plans, product processing and shipping, classified dial-up experiment, data base descriptions, interim system and redesign, and shared cataloging.

Dr. Smith co-authored and presented a paper on a bearing inspection facility developed by Southwest Research Institute at the AGARD Specialists Meeting on Nondestructive Inspection Relationships to Aircraft Design and Materials, held at Voss, Norway, September 25-30.

At the 37th National ASNT Fall Conference and Quality Testing Show, NTIAC manned a booth at the Detroit Plaza Hotel, Detroit, Michigan, October 3-6. There was a good response to this exhibit; approximately 150 of our User's Guides and samples of the Newsletter were distributed.

During the period October 25-27, NTIAC participated in a jointly sponsored promotional booth at the American Society of Metals Materials Conference, held in conjunction with the National Conference of Power Transmission and the National Conference on Fluid Power, at Chicago McCormack Place. This exhibit was first jointly sponsored by the materials-oriented IAC's and it was most successful in the interest stimulated in a very large audience. NTIAC distributed over 200 copies of the general User's Guide for all IAC's as well as the specific User's Guide for NTIAC. We also contributed slides and developed a narrative for the automatic slide/audio part of the exhibit. The slide presentation was too long to maintain sustained audience attention, but it did attract people to the booth and was therefore worthwhile.

As an additional means of publicizing NTIAC, Dr. Smith has prepared a short article titled, "Nondestructive Testing Information Analysis Center." This article has thus far been published in Optical Engineering magazine, Vol. 16, No. 5, pp. SR-135 and 136, September-October 1977, and the Smithsonian Science Newsletter, Vol. 6, No. 5, March 1977, p. 6.

Dr. Peter Stein, education director for the Instrument Society of America, offered to make our Newsletters and User's Guides available at various conferences to be held by that society. We provided Dr. Stein with 150 copies of each.

During the year we sent letters to eight potential wholesalers for our products, including NTIS and ASNT. We have had favorable responses from most of these wholesalers, including ASNT, which, as is discussed elsewhere, has already begun to promote our products in a flyer appearing in Materials Evaluation magazine. See Appendix B for a copy of this flyer.

Our original supply of User's Guides was exhausted during the year, and we have there prepared 5,000 copies of an updated version of the guide.

During the year visitors to NTIAC included Mr. J. Blue, DLA, Charles Merhib, AMMRC, Sam Valencia, AMMRC, and Steve Rubin, MCIC.

Table 6

**Promotional Meetings for Period 15 February 1977 through 15 February 1978**

<b>Texas Chapters of the Special Libraries Association, and American Association for Information Science Conference</b>	<b>19 February 1977, San Antonio, Texas</b>
<b>Society of Manufacturing Engineers Conference</b>	<b>2 March, 1977, Houston, Texas</b>
<b>ASNT Spring Conference</b>	<b>28-30 March, 1977, San Antonio, Texas</b>
<b>ASNT South Texas Section Conference</b>	<b>20-22 April, 1977, San Antonio, Texas</b>
<b>IAC Directors Meeting</b>	<b>28 March - 1 April, 1977, Chicago, Illinois</b>
<b>ASNT Radiography Conference</b>	<b>2-5 August, 1977, Wilmington, Delaware</b>
<b>DDC Users Conference</b>	<b>23-25 August, 1977, Alexandria, Va.</b>
<b>AGARD Specialists Meeting</b>	<b>25-30 September, 1977, Voss, Norway</b>
<b>ASNT Fall Conference</b>	<b>3-6 October, 1977, Detroit, Michigan</b>
<b>ASM Conference</b>	<b>25-27 October, 1977, Chicago, Illinois</b>

D. Inquiries and Special Services

NTIAC responded to 104 inquiries during the period 15 February 1977 to 15 February 1978. Table 7 summarizes inquiry activity for the year.

Twenty nine bibliographies were delivered at a total charge of \$4,259. (This figure represents the amount billed during this reporting period. The dollar amount on Form 1261 for Item 3, Bibliographic Inquiries, shows income actually received during this same period). Of these, only three were for government agencies. Three bibliographies were delivered at no charge, and one demonstration was performed on the RDT&E terminal at no charge, for AMMRC. NTIAC received a request from the Infrared Information Analysis Center, at Ann Arbor, Michigan, for a reciprocal exchange of information; we responded to this request at no charge. At the request of a Texas A & M University professor, NTIAC performed a demonstration and furnished a bib to two of his students at no charge. Three searches were performed and bibs ordered for products now in progress at NTIAC.

Twenty eight inquiries were for technical information and 45 were for general or cost information. Of these informational inquiries, 11 were for government agencies.

It seems reasonable to expect that as NTIAC becomes progressively better known to the NDT community, the number, scope, and (correspondingly) income derived from technical and bibliographic inquiries will continue to increases. It is nevertheless of continuing concern that utilization of NTIAC by DoD agencies is not as high as could reasonably be expected. Procurement difficulties posed by the cost recoupment policy, as experienced by DoD bench level scientists and engineers, is thought to be a major factor here.

Table 7

**Technical and Bibliographic Inquiries**  
**15 February 1977 - 15 February 1978**

<u>No.</u>	<u>Source</u>	<u>Type</u>	<u>Amt.</u>	<u>Date</u>
0214	University of Wisconsin	Tech. Inq.	\$ n/c	2/28/77
0215	AMMRC	Anntd. Bib	n/c	3/01/77
0216	Midwest Research	Std. Bib	70.00	3/06/77
0217	NSRDC	Std. Bib	230.00	3/02/77
0218	AiResearch	Info	n/c	3/16/77
0219	Sikorsky	Info	n/c	3/17/77
0220	Bolt Berenek & Neuman	Std. Bib	n/c	3/18/77
0221	Bendix	Quotation	n/c	3/22/77
0222	NBS	Bib	160.00	3/22/77
0223	Boston University	Info	n/c	3/24/77
0224	Second Foundation	Quotation	n/c	3/29/77
0225	Northern Electric	Info	n/c	5/09/77
0226	Battelle	Info	n/c	5/13/77
0227	Endevco	Info	n/c	3/15/77
0228	Phila. Naval Shipyard	Info	n/c	4/08/77
0229	SwRI - Dept. 02	Bib	120.00	3/03/77
0230	SwRI - Dept. 02	Bib	180.00	3/17/77
0231	SwRI - Dept. 15	Bib	220.77	5/17/77
0232	SwRI - Dept. 15 (NTIAC)	Bib	n/c	3/31/77
0233	SwRI - Dept. 11	Bib	n/c	4/15/77
0234	SwRI - Dept. 14	Info	n/c	4/15/77
0235	SwRI - Dept. 11	Info	317.12	5/02/77
0236	SwRI - Dept. 02	Bib	78.44	5/04/77
0237	SwRI - Dept. 15	Info	n/c	5/04/77
0238	SwRI - Dept. 11	Bib	342.52	5/15/77
0239	SwRI	Bib	90.31	5/16/77
0240	SwRI	Info	n/c	5/16/77
0241	SwRI	Bib	144.32	5/18/77
0242	SwRI	Bib	23.20	5/18/77
0243	SwRI	Info	n/c	5/18/77
0244	SwRI	Info	n/c	5/18/77
0245	Law Eng'g. Testing Co., Atlanta	Info	n/c	5/19/77
0246	Norris Industries, L. A., CA.	Info	n/c	5/16/77
0247	Trodyne, Peterboro, N.J.	Info	n/c	5/19/77
0248	Part of 0241	Bib	n/c	5/18/77
0249	NTIAC	Bib	n/c	5/24/77
0250	SwRI	Bib	190.93	5/27/77
0251	NTIAC	Bib	n/c	5/27/77
0252	Army Research Ctr.	Bib	n/c	6/08/77
0253	SwRI	Bib	242.20	6/08/77
0254	NTIAC	Bib	n/c	6/16/77
0255	Univ. of Texas, El Paso	Info	n/c	6/20/77
0256	Northrop, Newbury Park, CA.	Info	n/c	6/27/77
0257	R. M. Hardy Assoc., Edmonton, Alberta	Info	n/c	7/05/77

<u>No.</u>	<u>Source</u>	<u>Type</u>	<u>Amt.</u>	<u>Date</u>
0258	Simplott Co., Caldwell, ID.	Bib	90.00	6/27/77
0259	Sgt. W. B. Murray, Colo. Sprgs.	Info	n/c	7/06/77
0260	AMMRC	Info	n/c	6/22/77
0261	Northern Elec., Hattiesburg, MS.	Bib	n/c	7/12/77
0262	Oregon Dept. of Transportation	Proposal	n/c	7/12/77
0263	SwRI	Bib (in progress)		7/14/77
0264	NBS, Washington, D.C.	Bib	350.00	7/21/77
0265	Bentley Nevada Co., Minden, NV.	Info	n/c	8/04/77
0266	NASA, Indianapolis	Proposal	n/c	8/12/77
0267	NBS, Washington, D.C.	Proposal	n/c	8/12/77
0268	SwRI	Bib	48.00	8/16/77
0269	SwRI - NTIAC	Bib	n/c	8/17/77
0270	Rock Island Arsenal	Info	n/c	8/30/77
0271	Airco-Speer Div.	Info	n/c	9/09/77
0272	Union Carbide	Info	n/c	9/09/77
0273	SwRI	Bib	30.00	9/14/77
0274	AMMRC	Bib	n/c	9/28/77
0275	SwRI	Bib	110.00	9/19/77
0276	General Dynamics	Proposal	n/c	9/29/77
0277	MIT	Info	n/c	9/15/77
0278	Tech. Research Center, Finland	Bib	115.00	9/19/77
0279	DLA	Info	n/c	9/23/77
0280	N. Y. City Transit	Info	n/c	9/21/77
0281	Tech. Research Center, Finland	Info	n/c	10/04/77
0282	Telephone Comm. of America, Inc.	Info	n/c	10/19/77
0283	Wyman Gordon	Bib	115.00	11/04/77
0284	SwRI	Bib	n/c	10/30/77
0285	VETCO Services	Proposal	n/c	11/01/77
0286	Infrared Inform. Analysis Center	Bib	n/c	11/07/77
0287	SwRI	Bib	137.58	11/08/77
0288	SwRI	Bib	n/c	11/08/77
0289	Smith Kline	Bib	90.00	11/21/77
0290	Inst. Telecommunication	Info	n/c	11/21/77
0291	SwRI	Bib	n/c	11/23/77
0292	SwRI	Info	n/c	11/28/77
0293	Rhodes Eng. Co.	Info	n/c	11/11/77
0294	Johns Hopkins	Info	n/c	11/08/77
0295	WJW Eng.	Info	n/c	11/08/77
0296	ARADCOM	Info	n/c	11/08/77
0297	Nuclear Reg. Com.	Info	n/c	11/28/77
0298	SwRI	Info	n/c	11/28/77
0299	IITRI	Info	n/c	11/29/77
0300	Wayne State University	Info	n/c	11/30/77
0301	India	Proposal	n/c	12/12/77
0302	Peabody Testing	Bib	125.00	12/14/77
0303	SwRI	Info	n/c	12/14/77
0304	Texas A & M	Proposal	n/c	12/16/77
0305	SwRI	Bib	90.00	12/21/77
0306	SwRI	Info	n/c	12/21/77
0307	SwRI	Bib	95.00	1/23/78
0308	SwRI	Bib	215.00	1/23/78

<u>No.</u>	<u>Source</u>	<u>Type</u>	<u>Amt.</u>	<u>Date</u>
0309	Net Systems, Inc.	Info	n/c	1/25/78
0310	SwRI	Bib	129.00	2/06/78
0311	Smith Kline	Bib	110.00	2/10/78
0312	NBS	Info	n/c	2/10/78
0313	SwRI	Info	n/c	2/10/78
0314	Texas A & M	Info	n/c	2/13/78
0315	D. J. White	Info	n/c	2/14/78
0316	Phil. Energy Research	Tech Info	n/c	2/16/78

**E. Technical Publications**

We have prepared drafts of two technical publications for review by the contract monitor, a state-of-the-art survey on automated radiography and a critical review on liquid crystals for NDE. We also have under preparation a critical review on eddy current applications and a yearbook on NDT. Both of these latter publications are in the final stages of drafting.

We have upgraded our publication support system for formating, composing, and printing our publications by addition of photo-electronic equipment. This addition greatly simplifies and expedites the entire publication process.

We have also initiated informal agreements with wholesalers throughout the world to market our products. Included in these wholesalers is ASNT, which has already publicized our offerings in a recent flyer, previously referred to.

Our publications are enjoying a good acceptance by the technical community as is shown by the following Table 8.

Table 8

**1977 Publications Sales**

<u>Publication</u>	<u>Sales</u>
NTIAC-76-1	33
NTIAC-76-2	71
NTIAC-77-1	95

### III. FUTURE PLANS

#### A. Current Awareness and Promotional Activities

We will attend the Second International Conference on Nondestructive Evaluation for the Nuclear Industry, to be held at Salt Lake City, February 13-16, and then proceed to the Materials Technology Conference, sponsored by the Department of Defense and held at the Institute for Defense Analysis. At this conference the special display booth prepared by all the materials-oriented IAC's will be set up in the area adjacent to the conference room entrance. There will be no other displays, permitting us to be the sole display attraction for the 400 expected participants.

During May we will man a display booth at the first American Society for Quality Assurance Exposition and Conference, to be held at the Palmer House, Chicago, Illinois. We are expecting a very high return from this promotional exhibit, inasmuch as the ASQC has never before sponsored an exhibition at its conferences. The membership of ASQC exceeds 30,000, and we therefore could very well greatly expand our Newsletter membership list and also attract an entirely new user community.

Later in the year we plan to attend the Annual Rockwell Conference on Quantitative NDE, and in August, Dr. Smith will chair the Engineering Foundation Conference on The Role of Education in Nondestructive Evaluation, which conference is sponsored in cooperation with ASNT. At this conference, NTIAC will distribute its User's Guides and samples of the Newsletter. The audience for this conference will be largely from academic institutions, but also from industry and government agencies.

Still later in the year we will have a booth at the Annual Fall ASNT Conference, and will attend the conference on NDT in Materials and Energy Conservation, also sponsored by ASNT, and to be held at Arlington, Virginia.

#### B. Products and Services

During the coming year we shall be publishing two new critical reviews, (in addition to the critical reviews on liquid crystals for NDE and applications of eddy currents, now being drafted and reviewed.) We will publish two new state-of-the-art surveys, in addition to the one on automated radiography currently under review by the technical monitor. A tentative list of titles and SwRI experts who may author these titles is included in Table 9.

The NTIAC Yearbook will also be published, as it is now nearly completed in draft form.

We also have under consideration the publication of a book on NMR for NDE.

We will be offering a new service, on a trial basis, in the form of pre-packaged bibliographies on selected topics of unusually wide interest and

importance to the user community. The first two topics will be eddy current NDE applications and NDE of residual stresses. These will be announced shortly in the Newsletter.

**Table 9****NTIAC****Tentative Topics and Authors****CR & SOAS - 1978**

<u>Topic</u>	<u>Author</u>
Ultrasonic Evaluation of Structural Integrity	George Gruber
Signal Analysis in NDT	Derwin King
Magnetic Methods (but not eddy-current)	Devon Smith
Composite Materials NDT	Cecil Teller
NMR for NDT	G. Matzkanin/W. Rollwitz
NDE for Nuclear Power Industry	A. Greer/S. Wenk
Laser NDT Techniques	W. Bradshaw/I. Ash
Automated Optical Inspection	I. Ash/W. Bradshaw

**APPENDICES**

## APPENDIX A

## Newsletter Reader Survey Summary

Table I. Reader Profile

For each category, please indicate as many areas as apply to your interests.

## 1. Your Background

-Engineering	54%
-Metallurgy	30
-Materials Science	23
-Physics	18
-Chemistry	4
-Ceramics	2
-Architectural design	0.3

## 2. Present Position

-Quality Control/Assurance	56%
-Management	36
-Research	26
-Teaching	12
-Design	7.5
-Plant operation	4
-Construction	2.5

## 3. Type of Organization

-Component/Equipment manufacturer	30%
-Government agency	17
-Industrial laboratory	15
-Independent research and development	6
-National laboratory	5.5
-University	4
-Architectural engineering firm	3.5
-Construction firm	3
-Pilot plant	0.3

Table II. Areas of Interest

<b>1. Test Methods</b>	
-Ultrasonic testing	84%
-Radiography	72
-Penetrant testing	70
-Magnetic particle testing	62
-Eddy current	60
-Acoustic emission	46
-Leak testing	37
-Optical methods	32
-Automated testing	30
-Sonic testing	30
-Infrared testing	28
-Thermal testing	25
-Strain Sensing	20
-Magnetic field	19
-Electric current	11
-Mossbauer effect	7
<b>2. Applications</b>	
-Materials properties	61%
Metals and alloys	57
Polymers/plastics	17
Ceramics	13
Refractories	10
Rubber	8.5
-Materials evaluation	58
-Nuclear power plants	39
-Performance assurance/reliability	32
-Aerospace	30
-Materials R&D	28
-Power generation	30
-Technology transfer/data collection	13.5
-Primary metals	13
-Automotive	9
-Process Research	6

The numbers are the percentages of the 348 respondents indicating these items. The percentages may add to more than 100%, since most readers checked more than one item in each category. In addition to the items listed, there were many others indicated such as:

Background: consulting, welding fabrication, NDT, sales, marketing, accounting, electronics, quality assurance, nuclear, education, production, law, human factors, information research, mathematics, business, military.

Position: maintenance, consultant, standards writer, marketing, inspection, computers, safety, aircraft certification, manufacturers representative, ship repair, intelligence, quality, contract administration, plant representative, welding fabrication, sales.

Organization: pipelines, NDT sales, Government contractors, foundry/forgings, helicopters, utilities, basic metals, marine equipment, vocational school, contract research, independent laboratory, consulting, airlines, nuclear products, aerospace, engine overhaul, chemical plant, electronics systems, oil refinery, aircraft services, data systems.

The "Big Five" test methods are still the most popular. However, acoustic emission (AE) appears to be gaining acceptance rather rapidly. Only two unlisted methods were indicated - exoelectron emission and positron annihilation.

Table III. Comments on the Newsletter

Please rank the features of the Newsletter as to which are the most useful and informative for you (No. 1 is highest rank, No. 2, next, etc.)

1. Feature articles	(490)
2. NDT news items	(629)
3. Abstracts of interest	(864)
4. User's forum	(890)
5. Conference program briefs	(915)
6. Meetings calendar	(920)
7. Reports on meetings	(924)
8. Book reviews	(978)
9. Calls for papers	(1038)
10. Recent contract awards	(1103)

The contents of the Newsletter provoked quite a few written comments. The favorable and constructive comments outnumbered the unfavorable comments by eleven to one. The results of the Newsletter poll are listed above. The numbers in parentheses are the total scores.

#### WRITTEN COMMENTS

The readable written comments about the Newsletter are listed below. These comments are listed without editing.

- "I have only a peripheral interest in NDI, But like to read about the topic on a broad quick-scan basis. Your publication is just what I want."
- "Newsletter would be more useful if you would mail it to the UK by airmail - or have an agent here who receives all the UK copies and distributes them by local mail. Keep up the good work!!!"
- "Interesting Articles"
- "Very good newsletter"
- "Articles and summaries tend to show reviewers bias too much and too often"
- "Stimulating-informative within a brief few pages!!! Thus unique!"

. "Might be interesting to consider medical applications of NDT methods occasionally - i.e. U/S, X-ray, infrared, which may have industrial applications (or vice versa)"

. "Under the old system in Watertown, from time to time NDT as applied to food was presented. Since NTIAC has taken the function there is too much concentration on govt. work. Need more that applies to good and other commercial processing"

. "Scoring depends on issue - most of these items are important"

. "The present format has been most useful - the information is used as source material for our work in UT and AE projects."

. "Well Done!"

. "Newsletter is generally very good. Would like to see some articles on NDT methods and techniques that have proved successful in various industries that could be used in my work."

. "Helpful to me in seeing another viewpoint on NDT and relative importances."

. "I have just received two copies so far. Thanks"

. "A very good letter."

. "Very timely & informative. More info on codes and specification changes or reviews may be useful."

. "Report on up-to-date NDT Research and information."

. "Useful!"

. "Nice good job. Can we have more briefings on latest technical development, commercial or academic. Printing of entire paper can be left to ASNT's Materials Evaluation"

. "Contents are highly technical and more suitable to R&D. Hard to determine if reports have a application to the individual reader."

. "I enjoy & look forward to the NTIAC Newsletter each month & route same to all interested people in our Department"

. "Your Newsletter is most informative to this reader."

. "I find the Newsletter an excellent instructor on most recent advances and uses of NDT. It allows me in a HQ Management QA position to speak intelligently with action officers and test personnel in field organizations."

. "The Publication is much appreciated"

. "Keep up the good work!"

- "Your Newsletter fills a void in the NDT publication field & I find it quite informative"
- "Would like to have all info in reference to all phases of leak testing, if possible"
- "Desire more short articles on latest state of the art applications rather than long lengthy articles covering one subject."
- "A most timely publication."
- "I appreciate receiving the Newsletter, and feel that it is a real service to industry"
- "Excellent Letter, however, I would like to see more on thermal (infrared & liquid crystal) testing as it relates to NDT"
- "#1 through 10 are all most useful and informative"
- "Excellent Newsletter."
- "I find the inf. in this newsletter [sic] very informative, and topic of this nature is what I need more detailed information about."
- "We feel that caliber of newsletter (particularly feature articles) is lower than the quality of the CAB produced by MCIC at Batelle Columbus Laboratories. We feel that this situation should be remedied."
- "Recent reader of the newsltr. Comment based on only a few copies to date."
- "To date have received two issues. Found both of great and informative interest."
- "MORE, MORE, etc. There is still so much to be learned and passed on. Better dissemination will prevent reinvention of the wheel"
- "I find the Newsletter informative and always take time out to read the articles. Thank you for sending - Keep up the good work."
- "Would like to see a 'Letters to the Editor' section."
- "Very good paper."
- "I'm self employed servicing mostly oil refineries, chemical plants, and engineering firms. I'm interested in all types of tests. I find the newsletter informative."
- "A newsletter your newsletter is not. Not much in the way of news - just a big tech report and lots of bibliography to fill space. No news - dull reading. Past newsletters had too much non-ndt included. Suggest you analyze reports as to quality, pertinence, etc."

- "Most articles are very informative."
- "Your fine newsletter provides a much needed service to industry."
- "Brevity and factual content are noteworthy."
- "Feature articles are excellent source of technical information. Keep up the good work."
- "Newsletter is very interesting"

Now available through ASNT . . .

# NTIAC

## Publications

Nondestructive Testing Information Analysis Center

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### Proceedings of a Workshop on Nondestructive Evaluation of Residual Stress

This 384-page volume contains the results of a workshop held in San Antonio, TX, on Aug. 12-13, 1975, under the sponsorship of the Air Force Materials Laboratory, Wright Patterson Air Force Base, OH. The volume includes the formal presentations, the edited transcription of task group reports, task group worksheets, and a general summary and conclusion. In addition, a selective bibliography of relevant publications is included.

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### Electromagnetic-Acoustic Transducers A Survey of the State of the Art

This 1976 report is authored by R. E. Beissner, a staff scientist with the Department of Instrumentation Research, Southwest Research Institute, San Antonio, TX. It is intended to serve as a brief review and assessment of those aspects of electromagnetic-acoustic generation and detection of interest in nondestructive evaluation. Emphasis is placed on the principles of ultrasonic wave generation and detection as they relate to electromagnetic-acoustic transducer design.

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### Advanced Ultrasonic Testing Systems A State of the Art Survey

H. S. Silvus, Jr., with the Instrumentation Research Division of Southwest Research Institute, presents a concise survey of the state-of-the-art in advanced ultrasonic testing systems, techniques, and system components. The information presented gives a practical overview of the types of ultrasonic nondestructive inspection apparatus presently in use and of relatively new techniques which are being applied to improve the capabilities of such systems. The document is particularly useful to the reader with only introductory knowledge of ultrasonic nondestructive evaluation.

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Please send me the following:

- \_\_\_\_ copy (copies) of NTIAC-76-2, "Proceedings of a Workshop on Nondestructive Evaluation of Residual Stress." Price: \$37.50.
- \_\_\_\_ copy (copies) of NTIAC-76-1, "Electromagnetic-Acoustic Transducers—A Survey of the State of the Art." Price: \$12.50.
- \_\_\_\_ copy (copies) of NTIAC-77-1, "Advanced Ultrasonic Testing Systems—A State of the Art Survey." Price: \$20.00.

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**APPENDIX C**

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT		NAME OF INFORMATION ANALYSIS CENTER			QUARTER ENDING 2/15/78		CUMULATIVE THRU	
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED		COSTS INCURRED			INCOME	
		PRO-FES- SIONAL	NON-PRO- FESSIONAL	TOTAL	DIRECT	INDIRECT		
1. ACQUISITION AND INPUT OF SOURCE INFORMATION		110	251	361	4491	5318	9809	
a. DOCUMENTS ACQUIRED	602							
b. DOCUMENTS REVIEWED	412							
c. DOCUMENTS CATALOGED	412							
2. TECHNICAL INQUIRY RESPONSES PROVIDED	1	0	1	1	(484)	7	(477)	
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	11	0	48	48	(478)	522	44	
4. HANDBOOKS/DATA BOOKS COMPLETED		146	46.5	192.5	3281	3965	7246	
a. NEW CHAPTERS/PAGES COMPLETED	0							
b. REVISED CHAPTERS/PAGES COMPLETED	0							
c. DATA SETS COMPILED	0							
5. STATE-OF-THE-ART STUDIES COMPLETED	0	53	23.5	76.5	685	1108	1793	
6. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	0	202	172	374	3770	5106	8876	
7. CURRENT AWARENESS AND PROMOTION EFFORTS		517	332	844	11670	11614	23284	
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	11793							
b. NUMBER MEETINGS, CONFERENCES, ETC. SUPPORTED	1							
c. OTHER	--	--	--	--	--	--	--	
9. MANAGEMENT AND SUPPORT		145	284	429	5982	6652	12634	
10. UNASSIGNABLE INDIRECT COSTS		--	--	--	--	--	--	
11. TOTAL	1173	1153	2326	28,917	34,292	63,209	1872	

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT		NAME OF INFORMATION ANALYSIS CENTER			QUARTER ENDING		CUMULATIVE THRU 2/15/78	
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED		COSTS INCURRED			INCOME	
		PROFESSIONAL	NON PROFESSIONAL	TOTAL	DIRECT	INDIRECT	TOTAL	
1. ACQUISITION AND INPUT OF SOURCE INFORMATION		729	1238	1967	21,612	27,780	49,392	
a. DOCUMENTS ACQUIRED	2660							
b. DOCUMENTS REVIEWED	1855							
c. DOCUMENTS CATALOGED	1855							
2. TECHNICAL INQUIRY RESPONSES PROVIDED	28	3	3	6	(2141)	82	(2059)	
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	42	167	314	481	4044	6025	10,069	
4. HANDBOOKS/DATA BOOKS COMPLETED		369.5	80.5	450	7317	9098	16,415	
a. NEW CHAPTERS/PAGES COMPLETED	0						--	
b. REVISED CHAPTERS/PAGES COMPLETED	0							
c. DATA SETS COMPILED	0							
5. STATE-OF-THE-ART STUDIES COMPLETED	0	205	219.5	424.5	5594	5659	11,253	
6. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	0	528	295	823	9764	12,811	22,575	
7. CURRENT AWARENESS AND PROMOTION EFFORTS		1811.5	1165.5	2977	40,080	41,983	82,063	
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	50,798							
b. NUMBER MEETINGS, CONFERENCES, ETC. SUPPORTED	10							
c. OTHER	--	--	--	--	--	--	--	
9. MANAGEMENT AND SUPPORT		864	1092	1956	26,930	33,067	59,997	
10. UNASSIGNABLE INDIRECT COSTS		--	--	--	--	--	--	
11. TOTAL		4677	4407.5	9084.5	113,200	136,505	249,705	
							8749	